OAHU MUNICIPAL REFUSE DISPOSAL ALTERNATIVES STUDY

PHASE 1 - MANAGED COMPETITION STUDY

MAY 1999

PREPARED FOR:

CITY & COUNTY OF HONOLULU
Department of Environmental Services
Refuse Division
650 South King Street
Honolulu, Hawaii 96813

PREPARED BY:

R. M. TOWILL CORPORATION
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817
Telephone (808) 842-1133

In Association With
HDR Engineering, Inc.
271 Turn Pike Drive
Folsom, CA 95630

PHASE 1 - MANAGED COMPETITION STUDY

OAHU MUNICIPAL REFUSE DISPOSAL ALTERNATIVES STUDY

Prepared for

City and County of Honolulu
Department of Environmental Services
Refuse Division

Prepared by

R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817

In Association With

HDR Engineering, Inc.
271 Turn Pike Drive
Folsom, CA 95630

MAY 1999

TABLE OF CONTENTS

Page

SECTION 1 - INTRODUCTION 1-1
1.1 Overview 1-1
1.2 Existing Collection and Transfer System 1-1
1.2.1 City Collection 1-2
1.2.1.1 Collection Districts 1-3
1.2.2 Private Collection 1-5
1.2.3 Other City and County Collection 1-5
1.2.4 Self Haul 1-5
1.2.5 Convenience Center Collection 1-5
1.2.6 Transfer Stations 1-7
1.2.6.1 Keehi Refuse Transfer Station 1-7
1.2.6.2 Kapaa Refuse Transfer Station 1-8
1.2.6.3 Kawailoa Refuse Transfer Station 1-9
1.3 Final Treatment and Disposal 1-9
1.4 Diversion 1-10

SECTION 2 - BACKGROUND AND MANAGED COMPETITION 2-1
2.1 The Privatization Wave 2-1
2.2 Types of Privatization 2-1
2.3 Privatization - Pros and Cons 2-1
2.4 Impact on Solid Waste Facilities 2-2
2.5 The Privatization Movement and Managed Competition 2-3
2.6 Managed Competition in Solid Waste Management 2-4
2.7 Public Contract Operations 2-5
2.8 How Public Entities Can Compete 2-6
2.9 How to Prepare a Bid 2-6
2.10 Contracting for Services With a Private Firm 2-7
2.11 Review of State of Hawaii's Managed Competition (Act 230) 2-8
2.12 Conclusions 2-10

SECTION 3 - AUTOMATED REFUSE COLLECTION 3-1
3.1 Introduction 3-1
3.2 Service Description 3-1
3.3 Service Productivity and Costs 3-1
3.3.1 Productivity Levels 3-1
3.3.2 Productivity Service Costs 3-3
3.3.2.1 Comparison With Recent Private Bids 3-6
3.3.2.1 Comparison With Recent Public Competitive Bids 3-6
3.3.3 Conclusions 3-8
3.4 Optimization Strategies 3-8
3.4.1 Improve Equipment Availability 3-8

SECTION 4 - MANUAL REFUSE COLLECTION 4-1
4.1 Introduction 4-1
4.2 Service Description 4-1
4.3 Service Productivity and Costs 4-1
4.3.1 Productivity Levels 4-1
4.3.2 Service Costs 4-3
4.3.3 Conclusions 4-8
4.4 Optimization Strategies 4-8
4.4.1 Conversion From Manual Collection to Semi-Automated Collection 4-8
4.4.1.1 Introduction 4-8
4.4.1.2 Benefits and Drawbacks 4-9
4.4.1.3 Safety Impacts 4-9
4.4.1.4 Productivity Impacts 4-9

SECTION 5 - TRANSFER SERVICES
5.1 Introduction 5-1
5.2 Facility Reviews 5-1
5.2.1 Kapaa Refuse Transfer Station 5-1
5.2.2 Keehi Refuse Transfer Station 5-2
5.2.3 Kawailoa Refuse Transfer Station 5-2
5.2.4 Convenience Centers 5-3
5.3 System Productivity and Goals 5-3
5.3.1 Annual System Costs 5-3
5.4 Review of Operations 5-5
5.4.1 Kapaa Refuse Transfer Station 5-5
5.4.1.1 Current Staffing and Equipment 5-5
5.4.1.2 Optimal Staffing and Equipment 5-6
5.4.1.3 Station Operation 5-6
5.4.1.4 Transfer Hauling Operation 5-7
5.4.1.5 Transfer Trucks 5-7
5.4.2 Keehi Refuse Transfer Station 5-8
5.4.2.1 Current Staffing and Equipment 5-8
5.4.2.2 Optimal Staffing and Equipment 5-9
5.4.2.3 Station Operation 5-9
5.4.2.4 Transfer Hauling Operation 5-10
5.4.2.5 Transfer Trucks 5-11
5.4.2.6 Transfer Technology 5-11
5.4.3 Kawailoa Refuse Transfer Station 5-14
5.4.3.1 Current Staffing and Equipment 5-14
5.4.3.2 Optimal Staffing and Equipment 5-14
5.4.3.3 Current Conditions 5-14
5.4.3.4 Optimal Staffing 5-15
5.4.3.5 Transfer Trucks 5-16
5.4.4 Convenience Centers 5-16

5.5 Vehicle Maintenance Costs 5-20
5.5.1 Current Costs 5-20
5.5.2 Comparison to Other Systems 5-22
5.6 Optimization Strategies for Transfer Services 5-23
5.6.1 Transfer Station Optimization Strategies 5-23
5.6.2 Convenience Center Optimization Strategies 5-23

SECTION 6 - CONCLUSIONS AND RECOMMENDATIONS 6-1
6.1 Collection Services 6-1
6.1.1 Transfer Services 6-2

APPENDICES

APPENDIX A Transfer Station and Convenience Centers Cost, Tonnage, Staffing and Overtime Information

APPENDIX B Transfer Station Route Time, Staffing and Equipment Levels

APPENDIX C Keehi Transfer Station Preliminary Assessment Comparing Current system to Installation of Preload Compactors

APPENDIX D AES Cost Data and HDR Spreadsheet Computation

LIST OF TABLES

TABLE 1-1 City Collection Yard Vehicle Fleet (1998) 1-3
TABLE 3-1 Automated Collection Routes - 1996 3-2
TABLE 3-2 City/County of Honolulu Automated Refuse Collection Services - On-Route Productive Collection Hours 3-2
TABLE 3-3 City/County of Honolulu Automated Refuse Collection - Average Off-Route Collection Time 3-4
TABLE 3-4 Honolulu Automated Refuse Collection Productivity Comparison to Other Systems 3-6
TABLE 3-5 Honolulu Automated Refuse Collection Costs (FY 1996) 3-6
TABLE 3-6 Comparative Analysis of Automated Refuse Collection Costs 3-7
TABLE 3-7 Automated Refuse Collection Costs Based on Recent Competitive Public Bid 3-9
TABLE 3-8 Honolulu Refuse Collection Maintenance Costs - Benchmarking 3-10
TABLE 4-1 Manual Collection Routes - 1996 4-2
TABLE 4-2 City/County of Honolulu Manual Refuse Collection Services - On-Route Collection Hours and Productivity 4-2
TABLE 4-3 City/County of Honolulu Manual Refuse Collection - Average Off-Route Collection Time 4-4
TABLE 4-4 Public Solid Waste Collection Systems in the U.S. - Manual Collection Productivity Rates 4-5
TABLE 4-5 City/County Honolulu: Rear Loader FY96 Collection Costs 4-6
TABLE 4-6 National Refuse Collection Cost Data (Cities w/Municipal Collection) ... 4-7
TABLE 4-7 Analysis of Semi Automatic Collection 4-11
TABLE 5-1 Annual Transfer Station System Costs 5-4
TABLE 5-2 Kapaa Station - Authorized Operations Staff and Equipment 5-5
TABLE 5-3 Kapaa Station - Optimal Operations Staff and Equipment 5-6
TABLE 5-4 Keehi Station - Authorized Operations Staff and Equipment 5-8
TABLE 5-5 Keehi Station - Optimal Operations Staff and Equipment 5-10
TABLE 5-6 Keehi Transfer Station Comparison of Transfer Haul Costs for Current System vs. New Preload Compactors 5-12
TABLE 5-7 Kawailoa Station - Authorized Operations Staff and Equipment 5-14
TABLE 5-8 Kawailoa Station - Optimal Operations Staff and Equipment 5-15
TABLE 5-9 Cost and Summary Information on Convenience Centers 5-17
TABLE 5-10 AES Transfer Truck Vehicle Maintenance Cost Report FY96/97 5-21
TABLE 5-11 Transfer Truck Fuel and Maintenance Costs (July 1, 1997 to February 11, 1998) 5-21
TABLE 5-12 Comparison of Transfer Truck Maintenance Costs to Other Systems ... 5-22
TABLE 5-13 Summary of Transfer Station Staffing and Equipment Optimization Strategies 5-24

LIST OF FIGURES

FIGURE 1-1 Refuse Collection Yards and Collection Districts 1-4

SECTION 1
INTRODUCTION

1.1 OVERVIEW

This report presents the results of a Managed Competition (Phase I) study performed by R.M. Towill Corporation (RMTC) in association with HDR Engineering, Inc. (HDR) for the City and County of Honolulu (City), Department of Environmental Services, Refuse Division.

The purpose of this study was to provide the elected officials, managers, and employees of the City with sufficient information to determine whether managed competition and public contract operations should be pursued.

This report includes a description of concepts of managed competition and an evaluation of the collection and transfer services provided by the Refuse Division. Recent developments and cases in the privatization arena, managed competition, and relevant legislative conditions were discussed at meetings including RMTC and HDR staff and City officials. HDR also presented information on the topic to Refuse Division staff.

The evaluation of current services in this report includes:

- The current cost to provide services.
- Comparison to productivity or costs typically employed by private sector companies and other public agencies to provide these services.
- Recommended optimization strategies to improve efficiency and reduce costs to place the City in line to be competitive with private companies.

1.2 EXISTING COLLECTION AND TRANSFER SYSTEM

The City Department of Environmental Services Refuse Division administers the solid waste management system on Oahu, including collection, transport, and disposal. Private industry, other departments of the City, state and federal governments, non-profit organizations, schools, and individual residents all participate in the movement of solid waste from generation to ultimate disposal. The present role of each of these contributors is discussed in greater detail in the following subsections.

Collection within the City system has two components: residential and commercial. The City Refuse Division, licensed and unlicensed commercial haulers, and residents participate in the hauling process to collection centers. Single-family collection is primarily curbside pickup by the Refuse Division, supplemented by strategically located citizen drop-off facilities called convenience centers. Licensed private haulers collect most multiple-family housing and commercial establishment waste from dumpsters or compactor type containers at the establishments. The City does provide limited collection service at the curbside for selected small businesses and multi-family residences, amounting to about 11 percent of its total collection units serviced.

The City records the weight of solid waste collected within the solid waste management system using automated weighing systems at the transfer stations and disposal facilities.

1.2.1 City Collection

The Refuse Division provides collection service for most of the single-family residences on Oahu. This service is provided twice a week year-round, with the exception of Christmas and New Year's Day. To provide efficient and cost-effective collection, the Refuse Division has subdivided Oahu into three refuse collection sections. They are:

- Honolulu
- Windward
- Leeward and Central

The Honolulu Collection Section encompasses the City of Honolulu and extends roughly from Makapuu Point to the Honolulu International Airport in an east-west direction. The southern and northern boundaries are the ocean and the crest of the Koolau range, respectively.

The Windward Collection Section encompasses the eastern coastal region of Oahu from Makapuu Point north to Kawela Bay. The eastern and western boundaries are the ocean and the crest of the Koolau range, respectively.

The Leeward and Central Collection Section encompasses the remainder of Oahu. It generally is the area west of the crest of Koolau Mountain Range and north of the Honolulu Section.

1.2.1.1 Collection Districts

The Refuse Division has established seven Refuse Collection Districts for island-wide collection coverage. They are:

- Honolulu
- Koolaupoko
- Koolauloa
- Waialua
- Wahiawa
- Waianae
- Ewa

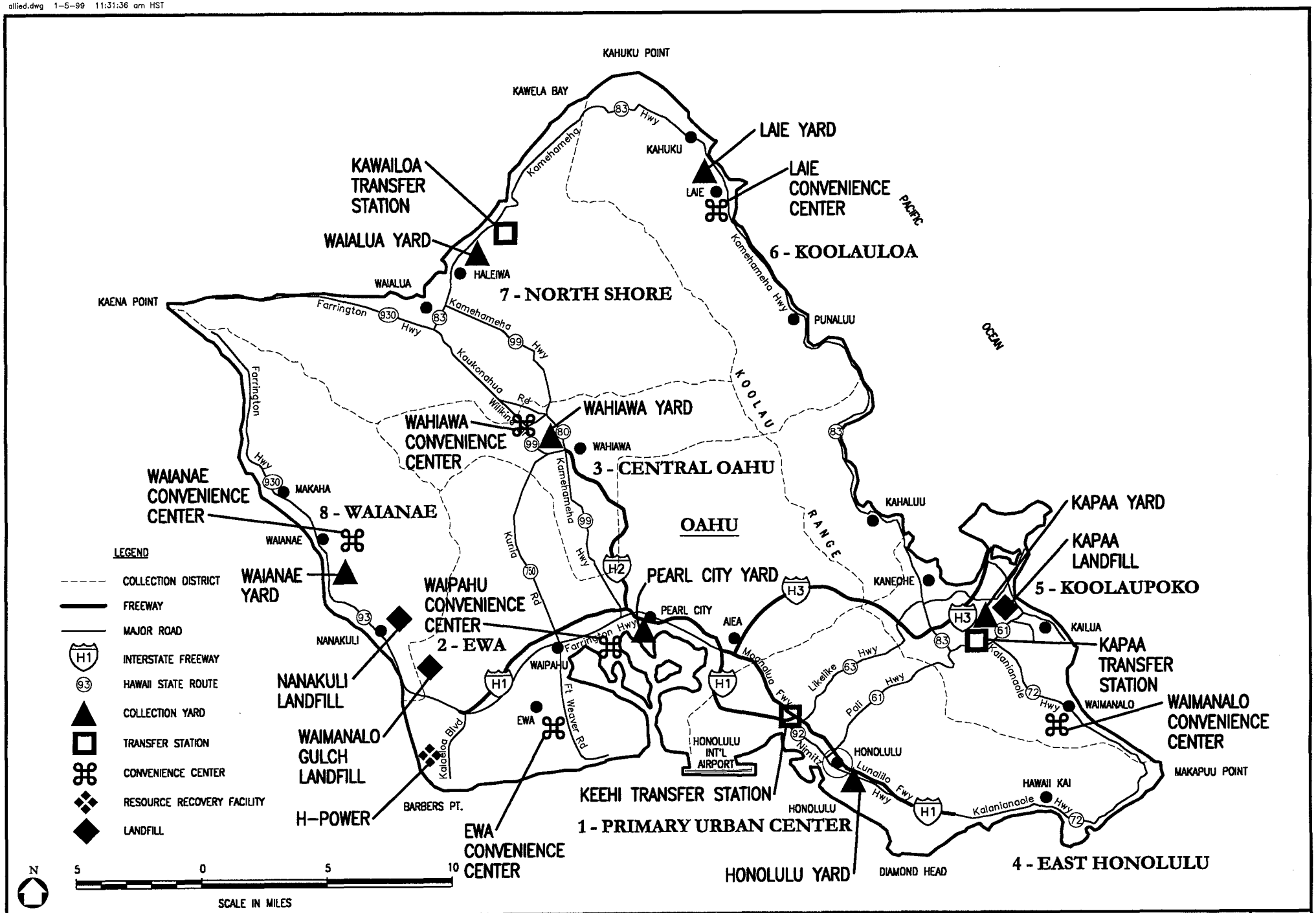
Figure 1-1 shows the limits of the Collection Districts. Within each Collection District the Refuse Division maintains a collection and utility vehicle base yard. The yard is used for fleet storage, vehicle fueling, and maintenance. Each yard has a service area map indicating the limits of the Collection District in which it is located. **Table 1-1** lists the City collection yard vehicle fleet.

TABLE 1-1
City Collection Yard Vehicle Fleet (1998)

District	Yard	Automated	20 CY (RL)	13 CY (RL)	30 CY (FL)	25 CY (OBW)	Utility Vehicle
Honolulu	Honolulu	19	54	6	2	2	14
Koolaupoko	Kapaa	8	22	--	1	--	3
Koolauloa	Laie	2	4	--	--	--	--
Ewa	Pearl City	17	35	--	2	--	6
Wahiawa	Wahiawa	8	11	--	--	--	--
Waialua	Waialua	--	4	--	--	--	--
Waianae	Waianae	5	9	--	--	--	--
	Total*	59	139	6	5	2	23

Key to Table
CY – Cubic Yards RL – Rear Loader FL – Front Loader
OBW – Oversize Bulky Waste Vehicle, Utility Vehicle-Pickup Truck, Wagons, Stake Truck

allied.dwg 1-5-99 11:31:36 am HST



R. M. TOWILL CORPORATION HDR ENGINEERING, INC.	**OAHU SOLID WASTE DISPOSAL ALTERNATIVES STUDY** REFUSE DIVISION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY AND COUNTY OF HONOLULU	PHASE I - MANAGED COMPETITION STUDY **CONVENIENCE CENTERS, TRANSFER STATIONS & REFUSE COLLECTION YARDS & DISTRICTS**	FIGURE **1-1**

1.2.2 Private Collection

There are 14 licensed commercial haulers operating on Oahu as of November 1998. They provide collection service for high-rise, multi-family buildings, large and small commercial establishments, and military facilities. The licensed haulers in 1991 on Oahu are listed below:

- Alii Refuse Corp.
- Anunue Refuse Inc.
- Browning-Ferris Industries of Hawaii, Inc.
- GMI, Inc.
- Honolulu Disposal Service, Inc.
- Island Recycling, Inc.
- Kamaaina Refuse Company, Inc.
- S. Kaneshiro Trucking
- National Waste Removal Services, Inc.
- Philip Services Hawaii, Ltd.
- Red River Service Corporation
- Reliable Hauling and Recylcing
- Rolloffs Hawaii, Inc.
- Technology Services International, Inc.

1.2.3 Other City and County Collection

Other agencies in the City also collect solid waste. These agencies are the Department of Facility Maintenance, Department of Transportation Services, and the Department of Parks and Recreation. The waste collected by these agencies is accounted for by computerized weighing as previously described.

1.2.4 Self-Haul

Residents and commercial establishments contribute to solid waste collection through self-haul. Residents; construction, demolition and renovation contractors; landscape firms; and other small businesses transport a small percentage of the total waste directly to convenience centers and transfer and disposal facilities.

1.2.5 Convenience Center Collection

The City operates six convenience centers. The convenience centers were intended to be a low-cost means for the residents of Oahu to have access to disposal services in addition to the twice-weekly collection at their place of residence. These facilities serve to discourage illegal dumping by providing convenient locations for solid waste drop-offs by households. Commercial refuse vehicles and contractors are not allowed at these centers. Derelict vehicles, hazardous wastes, and dead animal disposal are also prohibited.

The convenience centers typically are situated on paved, half-acre, fenced sites. The typical plan for five of the six centers is a 20-foot wide, paved access road leading to a drive-through, U-shaped, concrete ramp about 4 feet above grade. Users enter the facility, ascend the ramp, deposit their solid waste into the appropriate container(s), then descend and exit the facility. When containers are full, contract haulers remove and replace them. Filled containers are hauled to a designated disposal site. Separate containers are provided for greenwaste, combustible and noncombustible wastes. The convenience center at Wahiawa employs a compactor system for combustible solid waste. A description of each convenience center is provided below. Figure 1-1 shows the locations of these centers.

Centers are open from 7:00 a.m. to 6:00 p.m., 365 days a year. A contracted guard is on duty at each site during the hours of operation. City attendants are assigned to the Waianae, Waipahu, and Waimanalo Refuse Convenience Centers (RCCs).

Waimanalo Refuse Convenience Center – The Waimanalo Refuse Convenience Center is located on Hihimanu Street near the Waimanalo Wastewater Treatment Plant. The facility began operation in April 1985.

Ewa Refuse Convenience Center – The Ewa Refuse Convenience Center is located on Geiger Road next to the Honouliuli Wastewater Treatment Plant. The facility began operation in April 1987.

Waipahu Refuse Convenience Center – The Waipahu Refuse Convenience Center is located on Waipahu Depot Road approximately 1,500 feet south of Farrington Highway. The facility began operation in May 1987.

Laie Refuse Convenience Center – The Laie Refuse Convenience Center is located north of Laie, off Kamehameha Highway next to the City Refuse Division Laie Collection Base Yard. The facility began operation in December 1987, and it generally services residents from Kaaawa to Sunset Beach. The Laie Refuse Convenience Center has been retrofitted with a compactor.

Waianae Refuse Convenience Center – The Waianae Refuse Convenience Center began operation in September 1989. The facility is located next to the closed Waianae Sanitary Landfill. Access to the center is provided off Old Government Road and Hoopuhi Road northeast of the Waianae Intermediate School.

Wahiawa Refuse Convenience Center – The Wahiawa Refuse Convenience Center, the newest convenience center in the City disposal system, is located on Wilikina Drive near the intersection with Kamananui Road. The facility began operation in July 1992 and is different in design and operation from the other convenience centers because it has a compactor system for combustible waste fractions brought in by residents. Residents enter the facility and are directed by a full-time attendant to deposit combustible solid waste into an open-top hopper that feeds the compactor. When full, the hopper contents are fed into a closed roll-off container connected to the compactor equipment. Non-combustible waste is directed to an open-top, roll-off container located apart from the

compaction operation. The other significant difference is that this center has an end-dump platform instead of a U-shaped ramp.

1.2.6 Transfer Stations

To optimize the transport of collected solid waste to the disposal facilities on the island, the City operates the following three transfer stations:

- Keehi
- Kapaa
- Kawailoa

The Keehi Refuse Transfer Station uses closed-top trailers that are rear loaded, while the other two transfer stations use open-top trailers that are loaded from above. Refuse from three or four smaller collection vehicles is combined into a single larger trailer. This allows for more efficient transport to a combustion facility or landfill for disposal. The City owns and operates all of the transfer stations.

1.2.6.1 Keehi Refuse Transfer Station

Keehi Refuse Transfer Station is located off Middle Street on a 5-acre site in Honolulu, between the H-1 Freeway and the Fort Shafter Military Reservation. The facility, which is located in the City's Honolulu Collection District, serves the most populous area of Oahu and has been operational since October 1977. City collection vehicles deliver most of the solid waste received at the transfer station.

The facility has a one-way perimeter road and a 50-foot-long automated platform scale with remote operation. The transfer building contains a 12-bay depressed tipping floor with a 1,000-ton storage capacity, four compactors, and a maintenance shop. There is an open bay on the south side of the storage pit for future expansion. Other features include an emergency diesel generator, a fueling station with a 5,000-gallon underground storage tank, and a frictionless truck washing facility.

Future planned improvements include extending the single platform scale length to 70 feet, relocating the scale room next to the scale, and repaving the perimeter road and parking lot. Keehi Refuse Transfer Station receives solid waste from 4:00 a.m. to 6:00 p.m., Monday through Saturday. Refuse from self-haul commercial businesses using small vehicles without mechanical dumping capability is accepted from 9:00 a.m. to 2:00 p.m. Homeowners are permitted to use the transfer station for the disposal of combustible rubbish and green waste from 12:00 noon to 6:00 p.m.

The Keehi Refuse Transfer Station has a staff of 24, including three supervisors, six equipment operators, ten truck drivers, three scale attendants, and two laborers. Two automotive mechanics from the City's Automotive Equipment Service Division maintain the rolling stock.

The following equipment is operated and maintained at the transfer station:

- Four 7.5-cubic-yard wheel loaders
- One 1-cubic-yard backhoe with sweeper attachment
- One 1.5-cubic-yard backhoe with sweeper attachment
- One motorized street sweeper
- Three 7-cubic-yard compactors with computerized axle scales
- One 9-cubic-yard compactor with computerized axle scale
- Twenty truck tractors
- Nineteen 75-cubic-yard, closed-top, aluminum transfer trailers
- One 75-cubic-yard, closed-top, steel transfer trailer
- Two pickup trucks

1.2.6.2 Kapaa Refuse Transfer Station

Kapaa Refuse Transfer Station is located at the base of the closed Kapaa Sanitary Landfill on a site formerly mined as a rock quarry by Ameron HC&D. It is situated on the west side of Kapaa Quarry Road, which is west of Kawainui Marsh. Kapaa Quarry Road connects Kalanianaole Highway to Mokapu Saddle Road. The transfer station is one of four City operations on this site. Other City operations in the area include the closed Kapaa Landfill, Automotive Equipment Service Kapaa Yard, and Kapaa Refuse Collection Yard.

This transfer station began operation in May 1989. It has entrance and exit roads, an automated weigh station, vehicle parking, and the transfer building. The transfer building has an eight-bay depressed tipping floor with an 800-ton capacity storage, and two trailer load-out bays. Other features include administrative offices, locker room and lunchroom, and maintenance/storage areas.

The Kapaa Refuse Transfer Station is operated from 7:00 a.m. to 4:30 p.m., seven days a week. Homeowners are permitted to use the transfer station after 10:00 a.m. when the early morning congestion is over.

The transfer station currently maintains the following equipment:

- Three 5-cubic-yard wheel loaders
- One backhoe with sweeper attachment
- One motorized street sweeper
- Twelve truck tractors
- Twelve 105-cubic-yard open top transfer trailers
- Two pickup trucks
- One 14-cubic-yard dump truck
- Two knuckleboom loaders
- Three roll-off trucks

The transfer station currently has a staff of 23, including three supervisors, eight equipment operators, 13 truck drivers, two scale attendants, and four laborers. The supervisors also supervise post-closure landfill maintenance operations.

1.2.6.3 Kawailoa Refuse Transfer Station

The Kawailoa Refuse Transfer Station is located on Kawailoa Drive next to the closed Kawailoa Sanitary Landfill. This transfer station is on the northwest part of Oahu near the town of Haleiwa. Kawailoa Drive intersects Kamehameha Highway approximately 2,000 feet west of the site.

This transfer station began operation in April 1987. It consists primarily of entrance and exit roads, vehicle parking, and the transfer platform and hopper. The Kawailoa Transfer Station is an open-air facility in which the smaller collection trucks dump directly into a parked transfer trailer, after which the refuse is redistributed and tamped with a knuckleboom loader. The station is equipped with a scale which weighs City collection vehicles.

This transfer station also serves as a convenience center, allowing residents to dispose of their household solid waste.

The Kawailoa Refuse Transfer Station operates seven days a week from 7:00 a.m. to 3:30 p.m. The facility operates as a convenience center from 7:00 a.m. to 6:00 p.m. seven days a week.

This transfer station currently maintains and operates the following equipment:

- Four 105-cubic-yard aluminum open-top transfer trailers
- Four truck tractors
- One knuckleboom loader
- One backhoe loader
- One pickup truck

The station has six employees; one lead operator, two equipment operators, and three truck drivers.

1.3 FINAL TREATMENT AND DISPOSAL

Resource recovery and sanitary landfilling are important aspects of the existing City waste management system. The primary function of resource recovery is to reduce the volume and weight of refuse requiring land disposal. Modern resource recovery facilities, such as H-POWER (Honolulu Program of Waste Energy Recovery), recover energy. The energy recovered at H-POWER is electricity, and its sale offsets some of the operating cost of the facility.

Sanitary landfills are the most widely used waste management disposal option in the United States. Despite the unfavorable public perception of sanitary landfills, every community's waste management system requires one. Source reduction, recycling, and composting divert portions of the waste stream from final disposal, but not all materials can be recycled or composted.

Incineration of solid waste reduces waste volume, but combustion residue remains and requires land disposal.

There are three active licensed sanitary landfills and one active licensed construction/demolition landfill on Oahu. One sanitary landfill is owned by the City, the Navy and Marine Corps run the other two, and the construction/demolition landfill at Nanakuli is privately owned. The City-owned facility is the Waimanalo Gulch Sanitary Landfill. See Figure 1-1 for the location of these disposal facilities.

1.4 DIVERSION

The waste diversion program includes the following components:

- A drop–off system currently located at schools around the island. Materials collected include paper, plastic, aluminum and steel cans, and glass. The drop–off system is being expanded to additional schools and some commercial facilities, such as grocery stores.

- Green waste processing is done at three locations, two private operations and one operated by the Refuse Division (located at the Kapaa Landfill). The private operations produce both mulch and compost. The finished product is marketed in retail stores and in wholesale bulk. The Refuse Division operation produces mulch, which is provided free by the Refuse Division to the City parks and other departments and to the public.

- A statewide advanced disposal fee for glass provides an incentive for recycling that material. A fee of 1.5 cents is collected for each glass container entering the state. The processor is paid six cents per pound for the recycled glass.

- The Partnership for the Environment is a City supported organization comprised of representatives of companies that have extensive commercial recycling activities. The Partnership acts as an information source for expanding commercial recycling in the City.

- The City requires recycling of glass containers from bars and restaurants. It also requires office buildings greater than 20,000 square feet in size to recycle office paper, newspaper, and cardboard.

- Restaurants and other facilities that generate food waste are required to recycle that material.

- The City has a program to recycle materials from its offices.

- While not City sponsored, there are programs to recycle construction and demolition waste, tires, and appliances.

SECTION 2
BACKGROUND ON MANAGED COMPETITION

2.1 THE PRIVATIZATION WAVE

It is hard to pick up a trade journal today without reading another article about privatization. In increasing numbers, communities nationwide now are committing to a broadened private-sector role. Their goal is to deliver expanded and higher-quality services by shifting responsibilities for certain activities from the traditional public agencies to private companies. As a bonus, this approach often frees up funds for other purposes. Several success stories have attracted national attention in this regard.

What is fueling this explosion of interest in privatizing public services? It appears that there is a growing perception that municipal services are too expensive. Simply put, many people and their political representatives feel that the private sector can do it better.

2.2 TYPES OF PRIVATIZATION

The term "privatization" can mean different things to different people. Generally, with respect to the delivery of local government services, privatization takes two forms: full privatization and private contract operations.

Full privatization involves the private ownership and operation of facilities and equipment to provide a public service. For example, a number of waste-to-energy facilities are both privately owned, as well as privately operated.

Private contract operations involve the operation of a publicly owned facility by a private firm. In this approach, the contract is generally for a term of three to five years. In Honolulu, for example, private firms operate H-POWER and the Waimanalo Gulch Landfill.

2.3 PRIVATIZATION – PROS AND CONS

The historical pros and cons associated with privatization are just as valid today.

On the plus side, privatization enables communities to transfer operational responsibilities for a service to a private company. Often, performance guarantees backed by private dollars are provided. Through privatization, communities have access to private capital and technical

expertise. Finally, privatization, in some cases, offers local governments an alternative method of dealing with labor unions.

Privatization also has a negative side. While services can be contracted out, the responsibility for providing the service always remains with the public agency. The public agency no longer has direct control over service delivery but must rely on the strength and terms of the contract. Often this can be frustrating (and expensive) when it comes to providing special services not envisioned when the contract was negotiated.

Privatization can result in increased liability in some cases. For example, if a local government contracts for waste disposal, it "buys into" the liability of the private disposal site, which may serve a number of other communities. In the case of Oahu landfills which serve only one community, however, this is not be an issue. In addition, Waste Management Inc. is contractually responsible for liability at the Waimanalo Gulch Landfill.

Finally, privatization can put a local government at a competitive disadvantage in the long term. If a local government privatizes a solid waste service, generally the contract is for a short term, typically three to five years. During this time, the local government gets out of the business. When it comes time to renew the contract, it is difficult for the local government to get back into the business. Also during that time, the private company can achieve a monopoly, especially with respect to disposal. The long-term result is often reduced competition and higher costs.

When considering privatization, both the pros and cons should be fully understood and evaluated by the community.

2.4 IMPACT ON SOLID WASTE FACILITIES

Privatization, both full privatization and private contract operations, is nothing new to the solid waste industry. In the U.S. most waste-to-energy facilities, such as H-POWER, are either fully privatized or operated under private contracts. Many communities rely on private companies for waste collection and landfill disposal. With respect to solid waste management, the new privatization wave is changing the public/private service delivery mix in a field already accustomed to and heavily reliant on the delivery of services by the private sector. In addition, there appears to be a growing trend toward the private contract operation of publicly-owned solid waste facilities.

The new privatization wave is impacting all facets of the public solid waste sector, including collection, transfer, processing, and disposal.

- **Collection** – Solid waste collection services have traditionally been provided by a combination of public agencies and private companies. In many communities, public forces collect residential solid waste, while one or more private firms collect commercial waste.

  With the new privatization emphasis, however, there is pressure to privatize even more. For example, in Charlotte, North Carolina, the City decided to privatize one-quarter of its residential refuse collection service area in 1995. The City was not allowed to submit a bid for this service area, with the bid being awarded to BFI. In 1997, the City issued an RFP for collection services for another quarter of the residential service area. This time, however, the City was allowed to compete and was the successful bidder in a managed competition.

- **Transfer** – More communities are contracting out for the private ownership and operation of transfer stations. A new trend appears to be the contract operation of publicly-owned transfer stations.

- **Disposal** – As with collection, disposal services in many parts of the country are provided through a combination of public and private facilities. The new privatization wave, however, also involves the private design and operation of publicly-owned facilities. The City and County of Honolulu used this approach for the private operation of the Waimanalo Gulch Landfill. The City issued an RFP and received bids for the operation of the landfill itself. The increasing difficulty of siting new public landfills is also pushing the trend toward privatized disposal.

2.5 THE PRIVATIZATION MOVEMENT AND MANAGED COMPETITION

The current privatization movement has created a new opportunity for local government managers and employees, namely, to successfully compete with the private sector through a "managed competition" process that is used to procure contract services. It has been HDR's experience, in all of the managed competition processes in which we have assisted public sector agencies in preparing and submitting bids, that the public sector has handily won the competition.

In a managed competition procurement process, public employees are directed to bid against the private sector to determine the most efficient way of delivering the service. Through managed competition, the rules of competition are established to ensure that the competition is fair and that

neither the public nor private sector is given an unfair advantage. The use of managed competition to procure public services is growing at a rapid rate throughout the U.S.

2.6 MANAGED COMPETITION IN SOLID WASTE MANAGEMENT

The following points merit consideration with respect to the application of the managed competition process to the procurement of solid waste management services

- The managed competition for solid waste collection services is fairly straightforward. The services are well defined and the need to determine "pre-existing conditions," which arise in the contract operation of water and wastewater facilities, does not exist. Therefore, the focus is mainly on cost. For this reason, collection services proposals, once the proposers are prequalified, can be treated as bids, with the successful bidder identified at the bid opening.

- With respect to collection, public bidders generally have an older work force, which is a disadvantage, along with higher cost (better) fringe benefits and a restrictive purchasing system. Private bidders hire younger, more aggressive collectors. The public bidder has the traditional advantages of knowing the territory, having access to public capital, and not having to pay taxes or profit.

- The key determinants in collection costs are equipment capital costs, maintenance costs, and collection crew costs/productivity.

- The traditional equity issues of use of temporary/part-time labor from the overall City's collection workforce and the determination of variable/semi-variable overhead and indirect costs also exist.

- With respect to environmental liability, the current interpretation of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is that all participants in the landfill have "joint and several liability." In other words, everyone is liable no matter how much waste they contribute. Public entities, such as the municipalities or the military, are often major targets by lawyers to pay for cleanups since they do not go out of business and have relatively deep pockets. In managed competition, if a private entity is awarded disposal services at a different facility, the municipality may need to consider its increase in liability that could arise from waste disposed at multiple landfills.

2.7 PUBLIC CONTRACT OPERATIONS

Managed competition processes have ushered in a new method of public sector service delivery, namely, public contract operations.

Public Contract Operations involves the delivery of services by a public agency through the development and execution of a public "contract." The contract is actually a Memorandum of Understanding jointly agreed to by the Public Sector Service Provider (PSSP) and the local government. Importantly, the Memorandum of Understanding contains all of the relevant terms and conditions that the local government would include in a service contract with a private company.

Public Contract Operations can provide many benefits to the public sector service providers.

- **Scope of Services** – For probably the first time, the public sector service provider has a defined scope of services. This scope of services is established in a Request for Proposals (RFP), which defines what the public sector service provider is required to do. More importantly, it establishes what services are outside the scope of the contract. Similar to a private contractor, the public sector service provider can ask the local government for additional fees to provide these services.

- **Multi-Year Contract** – The public sector service provider has a multi-year "contract" with the local government. This contract delineates the responsibilities of both the contractor (in this case the PSSP) and the local government. If, for example, the local government has agreed to provide the contractor with a "safe and operable" facility, it must do so even if the contractor is a public one. In one project, the public contractor insisted that the local government install guard rails around the sedimentation basins in a water treatment plant because they were required to meet OSHA requirements, as written in the public contract.

- **Fixed Annual Fee** – The public sector service provider has an agreement with the local government that it will be paid a fixed fee over the term of the contract for the services provided. The local government can no longer arbitrarily cut service budgets (in this case, fees) to make up for budget shortfalls in other programs.

- **Gain-Sharing Opportunities** – If the public sector service provider provides the services at a cost less than the annual fee, there is an opportunity for the PSSP employees to participate in a "gain-sharing program" whereby they share directly in the savings.

2.8 HOW PUBLIC ENTITIES CAN COMPETE

The first step that public agencies can take is to get local policymakers to commit to managed competition, as opposed to privatization. Along with this commitment must come the understanding that the public agency is determined to be prequalified and therefore allowed to prepare and submit a bid.

In Charlotte, North Carolina, the public sector bidders were allowed to use the same performance incentives and efficiency investments that are used by the private sector. For example, new job classifications were created along with new (increased) pay scales. A gain-sharing incentive was given to the public employees. Automation investments were allowed as a part of the public bid. When considering competition, local public agencies should determine whether the flexibility exists in the areas of job classifications, pay scales, performance incentives, and capital investments to enable the public agency to submit a competitive bid.

2.9 HOW TO PREPARE A BID

Based on HDR's experience, there are certain guidelines that a public agency should follow when preparing a bid.

- **Know Current Cost and Level of Services** – Many public agencies do not know how much it costs to provide the services they are currently providing. In many cases, budgets do not include amortized capital costs (for equipment) or indirect costs. The first step is to determine the full cost of delivering each service. Along with costs, the public agency needs to quantify the level of service delivery. For example, with respect to solid waste collection, how many handicapped persons are provided with backyard service? How many special events requiring collection services are held each year? Local governments often find that they are providing a relatively high level of service—with a corresponding high cost.

- **Provide Only Services Requested in RFP** – This concept is probably the hardest for public agencies to grasp, as public agencies typically provide whatever services are needed to "get the job done." The agency's bid should, however, cover only those services specifically requested in the RFP. For example, if the RFP requires the pickup of yard

waste that is bundled and less than 4 inches in diameter, the public agency's bid should not include the costs of collecting yard waste that does not meet these specifications.

- **Need to Be Prepared to Make Efficiency Investments** – To be competitive, public agencies need to identify efficiency investments and include them as a part of the bid. If a new collection truck will improve performance but has a higher capital cost, the public agency should be prepared to make such an investment in the more efficient trucks. The higher costs, including financing costs, must be included in the bid and paid for out of the revenues received for providing the service.

- **Need to Be Able to Change Work Rules** – The public agency needs to be able to "mimic" private sector work rules and performance incentives. For example, the use of 10-hour workdays and productivity-based pay should be allowed and considered.

2.10 CONTRACTING FOR SERVICES WITH A PRIVATE FIRM

In some cases, the community may not allow public sector bids but rather will decide to privatize a solid waste service. In such cases, the following issues should be considered.

- **Need to Specify Types and Levels of Service** – Private companies are accustomed to bidding only for those services specifically requested in the RFP. Some companies will then charge the local community dearly for "specialty services" which are needed but are outside the scope of the contract. For this reason, the community should attempt to specify as many specialty services as possible in the RFP. Examples include the disposal of certain types of special wastes or the collection of refuse at community events.

- **Need to Address Issue of Maintenance** – For the case of private contract operation of a solid waste facility such as a transfer station, the issue of maintenance must be addressed. Since the contract is generally for a term of three to five years, the private contractor will only assume responsibility for routine maintenance. The definition of routine versus non-routine maintenance then becomes a critical issue. A related issue is the contractor's responsibility to return the facility to the community in the same condition as at the start of the contract, less "normal wear and tear." Again, the issue is one of definition—in this case, how do you define normal wear and tear? Both of these issues are important and must be addressed when contracting for the private operation of a public solid waste facility.

- **Need to Keep Competition in Service Area** – The major factor behind the low costs achieved through privatization is competition. Some communities make the mistake of removing competition from the procurement process when contracting out. For example, if refuse collection is contracted out, no one company should be allowed to provide service to the entire service area, as this can lead to a monopolistic situation. The alternative is to subdivide the service area and to require more than one service provider to serve the entire community. This issue is especially important with respect to disposal. Because of the difficulty associated with the siting of disposal facilities, monopolistic situations can arise on a regional basis. To avoid this situation, we advise local governments not to fully privatize their transfer facilities but rather retain control of the transfer function through public ownership of the facility. The local government can then direct the haulers to different disposal facilities depending on price and availability of disposal capacity.

- **Need to Consider Difficulty of Getting Back into the Business** – One of the major problems associated with the privatization of collection or disposal services is the difficulty of the public agency of getting back into the business if that should be desired or required at a future date. Once a local government is out of the collection or disposal business, it is extremely hard to staff and gear back up for public service delivery. Those communities considering full privatization of collection or disposal should be prepared to live with the privatization option for a long time.

2.11 REVIEW OF STATE OF HAWAII'S MANAGED COMPETITION (ACT 230)

This legislation "creates a special committee to begin the task of transforming the state's budgeting, accounting, and procurement systems." The committee "shall develop a managed process that enables state and county governments to implement public-private competition for government services through the managed process that determines whether a particular service can be provided more efficiently, effectively, and economically by a public agency or a private enterprise." The managed competition process "shall consider all relevant costs, identify the types of contracts which may be exempt from the managed process, establish protections for the affected state and county employees, and ensure that civil service laws, merit principles, and collective bargaining laws are not violated."

Finally, it provides provisions covering public employees [termed "covered" by the Supreme Court's decision in Konno v. County of Hawaii, 85 Haw. 61, 937 P.2d 397 (1997)] under managed competition. The legislature found that "contracts with private entities should not result

in the loss of a job by a covered employee, or the transfer of a covered employee to another position without adequate training or assistance to maintain the covered employee's ability to continue to perform the duties and responsibilities of the employee's assignments." The Act allows contracting out of services performed by a "covered" public employee and services that were customarily and traditionally performed by covered employees, "but prohibits contracts that result in the termination of a covered employee." Covered employees who are not terminated, but who are transferred to another position because of the contract shall be offered retraining or additional assistance to enable the transferred covered employee to maintain a similar, comparable, or better position in civil service. The bill specifies that "when the managed process for public-private competition is developed and implemented, state and county employers will be able to choose between "keeping public services in-house or outsourcing them." If the public employer's choice is to keep the services in-house, "employees who were transferred should be given the opportunity to be restored to their former positions or to remain in the positions to which they were transferred."

As stated in the legislation, "The purpose of this Act is to provide various means of making state government more efficient and more capable of competing in and supporting the efforts of Hawaii's businesses and enterprises to participate and compete successfully in the world's ever-evolving global economy."

To begin the transformation of the state's accounting and budgeting system and develop the managed competition process, a nine-member committee is to be established. An additional stipulation is that a performance-based budgeting system be utilized, which incorporates quantitative or qualitative indicators to assess the state's budget performance.

With respect to existing and future contracts, the bill makes exempt any agreements that are entered into prior to the effective date of the Act. Such agreements will not be bound by civil service and collective bargaining laws and will not be subject to the managed competition process review.

In contrast, any new contracts offered after the effective date of the Act and prior to July 1, 2001, must include a provision notifying any prospective contractors that such a contract will be subject to a single managed competition process review by the state or county. All of these contracts will continue to be exempt from civil service laws, merit principles, and collective bargaining laws for the duration of the contract even if a managed process is not implemented.

In summary, this legislation endorses the use of managed competition to reduce the costs and improve the efficiencies of government services. Importantly, it provides a framework for the establishment of ground rules for the managed competition process. The net impact of this legislation is to increase the likelihood of the Refuse Division being subjected to managed competition in the relatively near future.

2.12 CONCLUSIONS

The privatization trend appears to be here for the foreseeable future. In HDR's opinion, communities would be better served by adopting the managed competition approach, which allows for the selection of the best service at the lowest price, whether or not the service provider is public or private.

With managed competition, the public agency should be given the tools and the right to compete with private firms for the delivery of public services such as solid waste management services.

If a community decides to privatize, it should understand fully both the benefits and risks of doing so and recognize that such a decision is generally a long-term commitment for the community to privatization.

SECTION 3
AUTOMATED REFUSE COLLECTION

3.1 INTRODUCTION

The City and County of Honolulu is in the process of converting to the use of one-person, automated, refuse collection vehicles to provide refuse collection services to its single-family residential customers. According to the Refuse Division, currently about 45% of the 171,250 residential units, or approximately 77,000 units, are serviced by automated collection vehicles, which were first used by the City in 1992. This percentage is being increased on a yearly basis, until the planned 80% of all residential units are served with automated collection vehicles.

3.2 SERVICE DESCRIPTION

The City uses automated side-loader vehicles, with bodies manufactured by Heil and Wayne/Leach, to provide the automated service. The truck bodies range in size from 22 to 24 cubic yards in capacity. Each single-family household is provided a 96-gallon rollout container, which is serviced twice per week.

According to the union contract, automated collection crews are required to work up to 10 hours per day before receiving overtime.

3.3 SERVICE PRODUCTIVITY AND COSTS

3.3.1 Productivity Levels

To analyze the productivity levels and costs associated with the automated collection service, HDR analyzed data for the fiscal year (FY) 1995/1996 (the most recent year that detailed cost data by service type were available).

In FY 95/96, the City had 24 collection crews, which provided automated refuse collection service to single-family residences. These crews served a total of 67,159 households that year, or an average of 933 households per crew per day. The breakdown of these crews by collection service area is shown in **Table 3-1.**

The City keeps accurate records of the hours worked by each crew. HDR analyzed FY 97 data for automated crew work hours and concluded that each automated crew worked an average of 8.65 hours on the first collection day of the week and 7.44 hours on the second collection day **(see Table 3-2).**

HDR then determined the average amount of "off-route" time spent by each crew for each day. Non-productive time refers to time that the crew is not actively collecting refuse and involves such activities as travel time to the beginning of the route, hauling and disposing of collected wastes, and truck refueling.

Table 3-1
Automated Collection Routes – 1996

Yard*	No. Primary Trucks	No. Routes	No. Units
Honolulu	9	27	25,457
Pearl City	8	24	22,226
Kapaa	2	6	5,607
Laie	1	3	2,712
Wahiawa	3	9	8,356
Waianae	1	3	2,801
Total	**24**	**72**	**67,159**
Average No. Units/Route			**933**

* The Waialua yard does not include automated collection vehicles.

Table 3-2
City/County of Honolulu Automated Refuse Collection Services
On-Route Productive Collection Hours

Yard	Hours Per Route - Automated	
	1st Day	2nd Day
Honolulu	8.83	7.51
Pearl City	9.04	7.86
Kapaa	7.76	6.83
Wahiawa	8.87	7.56
Waianae	7.75	6.58
Waialua	--	--
Laie	6.63	5.93
Weighted Average	8.65	7.44
Off-Route Hours	3.20	2.76
On-Route Productive Collection Hours[1]	5.45	4.68
No. Units Served	930	930
No. Units Served/Prod. Coll. Hour	171	199

[1]Based on calendar year 1997 report – "PWR-C35, Route Analysis Refuse Collection Branch."

The estimated average amount of off-route time spent by automated collection crews is 3.20 hours for the first collection day and 2.76 hours on the second collection day **(see Table 3-3).** Therefore, on the average, each automated collection crew was determined to spend an average of 5.45 hours of on-route time during the first collection day and 4.68 hours on the second collection day. With each crew servicing an average of 933 households per day, it is concluded that each crew services between 171 to 199 units per on-route collection hour, or about 185 units per on-route productive collection hour.

HDR then proceeded to compare this productivity rate with other published rates for automated collection, as indicated in **Table 3-4**. These rates range from 116 units served per on-route hour in Charlotte, NC, to 164 units served in Sacramento County, CA. The City's productivity rate of 185 units served per on-route hour was the highest identified of the published rates.

It is known that automated collection productivity is directly related to the distance between houses, or housing density, and that the housing density of Honolulu is comparatively high. HDR therefore normalized the productivity rates reported for other jurisdictions by determining the ratio of their respective housing densities to that of Honolulu. The normalized productivity rates for these other jurisdictions ranged from 104 to 229 units served per on-route collection hour (at a normalized housing density of 1,062 housing units per square mile). The City's productivity rate of 185 units served per on-route collection hour is the third highest of the five service areas analyzed, even after the rates were normalized.

Based on this analysis, HDR concludes that the productivity of the City's automated collection crews is higher than average when compared with other jurisdictions providing automated collection services.

3.3.2 Productivity Service Costs

In FY 95/96, the City reported that the costs for automated collection services were $3,779,652. As indicated in **Table 3-5,** these costs include crew salaries and fringe benefits, equipment capital costs, indirect costs, and equipment maintenance. Considering the 67,159 households served by automated collection crews in FY 95/96, these costs translate to an average of $4.69 per household per month for this twice-per-week collection service.

HDR proceeded to compare this cost with other published costs for automated collection. However, most of the cost data refer to jurisdictions that provide once-per-week collection service.

Table 3-3
City/County of Honolulu Automated Refuse Collection – Average Off-Route Collection Time

Yard	Yard to Route (Min.)	Route to Dump	Stand Dump	Avg. Lost Time – Truck Breakdowns (Auto.)	Dump to Route	Dump to Yard	Office/Fuel/ Truck Check	No. Trips to Dump		Total Off-Route Time (Hrs)	
								First Day Collection Day 1	Second Day Collection Day 2	First Day Collection Day 1	Second Day Collection Day 2
HONOLULU	15	20	5	30	20	15	15	2.5	2	2.79	2.42
PEARL CITY	20	25	10	30	25	30	15	2.5	2	3.67	3.17
KAPAA	15	10	5	30	10	5	15	2.5	2	1.96	1.75
WAHIAWA	10	25	10	30	25	30	15	2.5	2	3.50	3.00
WAIANAE	20	20	10	30	20	20	15	2.5	2	3.17	2.75
LAIE	25	35	5	30	35	40	15	2.5	2	4.38	3.75
WEIGHTED AVERAGE										3.20	2.76

Table 3-4
Honolulu Automated Refuse Collection Productivity
Comparison to Other Systems

Jurisdiction		Units Served/ On-Route Hour	Housing Density (HH/Sq.Mi.)	Equivalent Units Served/Hr. (1,062 HH/Sq.Mi.)
Greensboro, NC	Private	164	761	229
Charlotte, NC	Public – City	116	746	165
Sacramento Co., CA	Public – County	150	--	--
Charlotte – SWSD	Public – Bid	135	746	192
Citrus Heights (Bid), CA	Public – Bid	164	1,667	104
Honolulu, HI	Honolulu, HI	185	1,062	185

Table 3-5
Honolulu Automated Refuse Collection Costs (FY 1996)

Description	Costs
Salaries and Wages:	
§ Direct Salaries and Wages	$1,058,225
§ Labor Fringe Costs	317,468
§ Indirect Costs	179,918
§ Current Expenses	9,763
Subtotal	$1,565,374
Vehicle/Equipment Maintenance:	
§ Labor Costs, Fringe, Operating Costs	$ 455,529
§ Indirect Costs	307,938
Subtotal	$763,467
Capital Cost Recovery:	
§ Equipment	$1,450,812
Total Refuse Collection Costs	**$3,779,652**
Tons Collected	82,814
$/Ton	$45.64
No. Households	67,159
$/Household/Month	$4.69

According to Dr. Barbara Stevens of Ecodata, Inc., the costs of a twice-weekly collection service have been historically found to be 1.26 times the costs of a once-per-week collection service[1]. Assuming this finding is applicable to Honolulu, the costs of an equivalent once-per-week automated collection service in Honolulu would be equal to $4.69 per household divided by 1.26, or $3.88 per household per month. HDR then compared this cost with the following:

- Recent private bids for once-per-week automated collection.
- Recent successful public bids for once-per-week automated refuse collection.

3.3.2.1 Comparison with Recent Private Bids

The calculated Honolulu cost of $3.88 per household per month for once-per-week automated collection is compared with recent bids received for the provision of once-per-week automated collection services to 32,000 households in Charlotte, NC **(see Table 3-6)**. As shown, these bids ranged from $1.74 per household per month to $3.82 per household per month, with an average of $3.29 per household per month. When "normalized" to account for the difference in salaries in Honolulu ($28,000 per year for automated collection crew personnel) and Charlotte ($23,000 per year), the average normalized cost is $3.57 per household per month, or about 92% of the calculated Honolulu automated service cost.

3.3.2.2 Comparison with Recent Public Competitive Bid

In September 1997, the County of Sacramento, CA, Waste Management and Recycling Division prepared a bid for the provision of solid waste management services, including once-per-week automated refuse collection, to the newly-incorporated city of Citrus Heights, CA. With a population of about 100,000 persons living in 25,000 residences, the City had issued an RFP for solid waste management services, from which it received three responsive bids—one from the County and two from national private solid waste management firms. Based on a review by a national consulting engineering firm, the County's bid was found to be the most economical and responsive.

HDR analyzed the cost components of the County's bid and calculated a "cost per household per month" for a once-per-week automated collection service. The corresponding calculated cost, in 1996 dollars, based on the Sacramento County bid, is $3.45 per household per month as shown in

[1] Stevens, Barbara J., Ph.D., "Curbside Recycling—Ways to Finance the Program," GRCDA Journal of Municipal Solid Waste Management.

Table 3-6

Comparative Analysis of Automated Refuse Collection Costs

Jurisdiction	Description	Cost/HH/Month	Normalized[4] Cost/HH/Mo
Honolulu	FY '96 Costs – 2x/Week Collection	$4.70	
	FY '96 Costs – 1x/Week Collection	$3.73 [1]	
	FY '97 Costs – 1x/Week Collection	$3.88	$3.88
Charlotte, NC	July '96 Reported Costs – 1x/Week Automated Collection	$3.82 [2]	$4.15
Waste Industries	2/97 Bid for 1x/Week Automated Refuse Collection – Charlotte, NC	$2.99 [3]	$3.25
USA Waste	2/97 Bid for 1x/Week Automated Refuse Collection – Charlotte, NC	$3.36 [3]	$3.65
Waste Management, Inc.	2/97 Bid for 1x/Week Automated Refuse Collection – Charlotte, NC	$4.71 [3]	$5.12
Charlotte, NC	2/97 Bid for 1x/Week Automated Refuse Collection – Charlotte, NC	$1.74 [3]	$1.89
BFI	2/97 Bid for 1x/Week Automated Refuse Collection – Charlotte, NC	$3.64 [3]	$3.96
Average Bid Costs		$3.29	$3.57

Notes:

(1) Assumes that 2x/week automated collection costs equal 1.26 x 1x/week collection costs. (Stevens, Barbara J., Ph.D., "Curbside Recycling – Ways to Finance the Program."

(2) City of Charlotte Solid Waste Services Costs of Service, July 1996.

(3) Bid does not include automated container costs.

(4) Bid costs were normalized by assuming that 40% of bid costs were salary-related (direct labor and fringe) and increasing the salary-related costs by a factor of 1.22 (i.e., the ratio of $28,000 annual collector's salary in Honolulu to $23,275 collector's salary in Charlotte.

Table 3-7. This bid price is about 90% of the calculated $3.88 cost for a once-per-week automated service provided by the City and County of Honolulu.

3.3.3 Conclusions

Based on our analysis, it is apparent that the performance of the City automated collection crews in Honolulu is at a high level when compared with published data from other U.S. jurisdictions. The costs of service is typical for automated refuse collection and appears to be competitive with recent bid prices and service costs offered by both public entities and private companies for automated refuse collection service. Our analysis indicates that costs could be reduced on the order of 10% to make the City's costs even more competitive, should the City be forced to compete in a managed competition process.

3.4 OPTIMIZATION STRATEGIES

3.4.1 Improve Equipment Availability

After labor costs, equipment costs represent the second largest cost category associated with refuse collection. Equipment costs can be divided into capital costs, maintenance costs, and operations (fuels/lube/tires) costs.

The equipment maintenance costs reported by various jurisdictions for automated refuse collection trucks are shown in **Table 3-8**. As indicated, equipment maintenance costs appear to be low when compared to other jurisdictions while fuel costs, as would be expected, appear to be higher than average. One reason for the lower maintenance costs is that the City trucks are relatively new. (Most of the 20 trucks used to derive the average 95/96 maintenance costs were one to two years old.)

The ratio of vehicles to primary routes in Honolulu is 1.5, indicating that, for every two primary route vehicles, the City has one spare vehicle. As shown in Table 3-8, this ratio is significantly higher than the 1.2 ratio reported for Charlotte, NC, and the Sacramento County Citrus Heights Bid, and somewhat higher than the 1.4 ratio indicated for Greensboro, NC. Even at this high ratio, the City reports that automated routes are sometimes left "standing" due to the lack of available automated collection vehicles. The City has indicated that one of the reasons for the relatively high spare ratio is the lack of a strong local market for used collection equipment.

Table 3-7
Automated Refuse Collection Costs Based on Recent Competitive Public Bid

Category	Cost
Capital Costs:	
§ Facility Costs	$ 7,950
Equipment:	
§ Collection Vehicles	$ 168,839
Labor:	
§ Collection	$ 467,847
§ Administration/Management	14,662
§ Other	15,000
Operations:	
§ Fuel	$ 25,722
§ Other	5,106
Maintenance:	
§ Contract Service	$ 175,000
§ Equipment Rental	28,686
Office:	
§ Office Lease	$ 9,600
G&A:	
§ Insurance	$ 28,450
§ Fee, Permits	14,844
§ Other	120,786
Total	**$1,082,492**
No. Households Served:	
Single Family 21,400	
Multi-Family 3,750	
Total	25,150
Cost/HH/Month – 1997$	$3.59
Cost/HH/Month – 1996$[(1)]	$3.45

Notes
Cost information taken from 9/97 bid from Sacramento County, CA, Waste Management and Recycling Division to provide solid waste management services to the city of Citrus Heights, CA.

(1) Assumes 1996-1997 inflation rate of 4%.

Table 3-8
Honolulu Refuse Collection Maintenance Costs – Benchmarking

Type of Equipment: **Automated**
Costs: **Per Equipment**

Jurisdiction	Ref.	Operations and Maintenance Costs			Spare Vehicle Ratio	Maintenance Cost per Primary Route
		Maintenance	Fuel/Lube	Total		
Honolulu, HI	1	$21,675	$9,673	$31,348	1.5	$32,513
Greensboro, NC	2			$30,000	1.4	--
Charlotte, NC	3	$29,000	$3,000	$32,000	1.2	$34,800
Charlotte – SWSD	4	$21,184	$4,500	$25,684	1.1	$24,150
Tacoma, WA	5	$20,000	$9,000	$29,000		--
Sacramento Bid	6	$25,000	$3,675	$35,200	1.2	$29,412

Ref.
1 Costs represent average costs for FY 95/96 calculated for 20 vehicles (manufactured in 1992-95).
2 Information provided by Mr. Don Enman, Equipment Division, City of Greensboro, in a telephone conversation, 12/12/96.
3 FY 96 vehicle maintenance costs reported for automated collection vehicles (Lodals).
4 Average annual automated vehicle maintenance costs bid by City of Charlotte Solid Waste Services Division in 1997 managed competition. Bid costs were agreed to in a Memorandum of Understanding signed between SWSD and the City's Equipment Maintenance Division.
5 1996 costs reported for City of Tacoma, WA.
6 Sacramento County Bid to provide solid waste collection services to the City of Citrus Heights, 98/99 budgeted costs.

Conclusions for Honolulu:
Maintenance costs are low to average.
Fuel costs are high (hilly terrain).
Spare vehicle ratio is high.

Maintenance costs per primary collection route can be calculated by multiplying the average maintenance costs per vehicle by the number of vehicles (primary plus spare) required per route. The results of this calculation, shown in **Table 3-8**, indicate that the City's maintenance costs per primary collection route appear to be relatively high.

In light of these findings, the City may want to develop an internal "memorandum of understanding" (MOU) with its Automotive Equipment Services Division (AES). The MOU should provide performance incentives to both equipment operators and maintenance personnel to minimize maintenance costs and leave "no routes standing." The MOU should also guarantee a minimum "Equipment Availability Factor" (i.e., a piece of equipment is guaranteed to be available for use 85% of the time). An MOU containing similar performance incentives was established in 1997 between the City of Charlotte's Solid Waste Services and Equipment Maintenance Divisions.

SECTION 4
MANUAL REFUSE COLLECTION

4.1 INTRODUCTION

The City and County of Honolulu is in the process of converting to the use of one-person, automated, refuse collection vehicles to provide refuse collection services to its single-family residential customers. Currently, manual, rear-loading collection vehicles service about 55% of the 171,250 residential units, or 94,200 units, with three-person collection crews. This percentage is being decreased on a yearly basis, until the planned 80% of all residential units are serviced with automated collection vehicles.

4.2 SERVICE DESCRIPTION

The City uses rear-loader vehicles, the majority of which are International 20-cubic yard compactors, to provide the manual collection service. Residents place refuse, either in cans or in bagged form, at the curb on the day of pickup. Under the current union contract, each three-person crew is limited to collecting 24,000 pounds of refuse per day, which equates to roughly 600 households at an average set-out rate of 40 pounds per household.

4.3 SERVICE PRODUCTIVITY AND COSTS

4.3.1 Productivity Levels

To analyze the productivity levels and costs associated with the manual collection service, HDR analyzed data for the fiscal year 1995/1996 (the most recent detailed cost by collection service data available).

In FY 95/96, the City had 51 collection crews that provided manual refuse collection services to single-family residences. These crews served a total of 91,800 households that year, or an average of 600 households per crew per day. The breakdown of these crews by collection service area is shown in **Table 4-1**

The City keeps accurate records of the hours worked by each crew. HDR analyzed 1997 data for manual crew work hours and determined that each manual crew worked an average of 3.81 hours on the first collection day of the week and 3.03 hours on the second collection day **(see Table 4-2).**

Table 4-1
Manual Collection Routes – 1996

Station	No. Primary Trucks	No. Routes	No. Units
Honolulu	20	60	36,000
Pearl City	8	24	14,400
Kapaa	13	39	23,400
Laie	1	3	1,800
Wahiawa	4	12	7,200
Waialua	2	6	3,600
Waianae	3	9	5,400
Total	**51**	**153**	**91,800**
Average No. Units/Route			**600**

Table 4-2
City/County of Honolulu Manual Refuse Collection Services
On-Route Collection Hours and Productivity

Yard	Hours Per Route	
	1st Day	2nd Day
Honolulu	3.75	2.93
Pearl City	3.97	3.03
Kapaa	3.74	3.01
Wahiawa	3.54	2.93
Waianae	4.78	4.11
Waialua	3.86	3.24
Laie	4.04	3.29
Weighted Average	3.81	3.03
Off Route Hours	2.11	1.34
On Route Productive Collection Hours	1.70	1.69
No. Units Served	600	600
No. Units Served/Prod. Coll. Hour	353	354

HDR then determined the average amount of "off-route" time spent by each crew for each day. Non-productive time refers to time during which the crew is not collecting refuse, and is used for such activities as travel time to the route, hauling and disposing of collected wastes, and truck refueling.

The estimated average amount of off-route time spent by manual collection crews is 2.11 hours for the first collection day and 1.34 hours on the second collection day **(see Table 4-3)**. Therefore, on the average, each manual collection crew was determined to spend an average of 1.70 hours of on-route time during the first collection day and 1.69 hours on the second collection day. With each crew servicing an average of 600 households per day, it is concluded that each crew services about 354 units per on-route collection hour.

The reported productivity rates for other U.S. public collection systems using manual rear-loader trucks and three-person crews, and providing twice/week collection, are provided in Table 4-4. As shown, the daily productivity ranges from 450-950 households per crew per day. Assuming that these crews are on the routes at least 3 hours per day, these productivity rates translate to 150 to 313 households per productive collection hour. Clearly, the Honolulu manual collection crews are seen to be highly productive when compared to these other systems.

4.3.2 Service Costs

In FY 95/96, the Refuse Division reported that the costs for manual collection services were $15,182,854. As indicated in **Table 4-5,** these costs include collector salaries and fringe benefits, equipment capital costs, and equipment maintenance. Considering the 91,800 households served by manual collection crews in FY 95/96, these costs translate to an average of $13.78 per household per month for this twice-per-week collection service.

HDR proceeded to compare this cost with other published costs for manual collection. However, most of the cost data refers to jurisdictions that provide once-per-week collection service.

According to Dr. Barbara Stevens of Ecodata, Inc., the costs of a twice-weekly collection service have been historically found to be 1.26 times the costs of a once-per-week collection service. Assuming this finding is applicable to Honolulu, the costs of an equivalent once-per-week manual collection service in Honolulu would be equal to $13.78 per household divided by 1.26, or $10.94 per household per month. This cost was then compared by HDR with 1996 national refuse collection data for cities with municipal collection **(see Table 4-6).**

Table 4-3
City/County of Honolulu Manual Refuse Collection – Average Off-Route Collection Time

Yard	Yard to Route (Min.)	Route to Dump	Stand Dump	Avg. Lost Time – Truck Breakdowns (Manual)	Dump to Route	Dump to Yard	Office/Fuel/ Truck Check	No. Trips to Dump		Total Off-Route Time (Hrs)	
								1ST Day Collection Day 1	2ND Day Collection Day 2	1ST Day Collection Day 1	2ND Day Collection Day 2
Honolulu	15	20	5	5	20	15	15	2.00	1.00	2.00	1.25
Pearl City	20	25	10	5	25	30	15	2.00	1.00	2.75	1.67
Kapaa	15	10	5	5	10	5	15	2.00	1.00	1.33	0.92
Wahiawa	10	25	10	5	25	30	15	2.00	1.00	2.58	1.58
Waianae	20	20	10	5	20	20	15	2.00	1.00	2.33	1.50
Waialua	25	35	5	5	35	40	15	2.00	1.00	3.33	2.08
Laie	25	35	5	5	35	40	15	2.00	1.00	3.33	2.08
Weighted Average										2.11	1.34

Table 4-4
Public Solid Waste Collection Systems in the U.S.
Manual Collection Productivity Rates

Jurisdiction	Vehicle Type	Collection Frequency	Crew Size	No. HH/Served/ Crew/Day
Austin, TX	Manual, rear loader	2X/Week	3	800-850
Metro Dade County, FL	Manual, rear loader	2X/Week	3	950
Escambia County, FL	Manual, rear loader	2X/Week	3	675
Hempstead, NY	Manual, rear loader	2X/Week	3	675
Indianapolis, IN	Manual, rear loader	2X/Week	3	800
Jacksonville, FL	Manual, rear loader	2X/Week	3	850
Jeckyl Island, GA	Manual, rear loader	2X/Week	3	450
Kill Devil Hill, NC	Manual, rear loader	2X/Week	3	400
Little Rock, AK	Manual, rear loader	2X/Week	3	600
Oyster Bay, NY	Manual, rear loader	2X/Week	3	800
Pensacola, FL	Manual, rear loader	2X/Week	3	475
City/County Honolulu	Manual, rear loader	2X/Week	3	600

Source: Solid Waste Association of North America, Getting More for Less: Collection Efficiency Study 1996.

Table 4-5
City/County, Honolulu: Rear Loader FY96 Collection Costs

Description	Costs
Salaries and Wages:	
§ Direct Salaries and Wages	$ 8,649,311
§ Labor Fringe Costs	2,594,793
§ Indirect Costs	147,058
§ Current Expenses	79,796
Subtotal	$12,794,448
Vehicle/Equipment Maintenance:	
§ Labor Costs, Fringe, Operating Costs	$ 763,240
§ Indirect Costs	515,950
Subtotal	$ 1,279,190
Capital Cost Recovery:	
Equipment	$ 1,109,216
Total Refuse Collection Costs	**$15,182,854**
Tons Collected	177,273
$/Ton	$85.65
No. Households	91,800
$/Household/Month	$13.78

Table 4-6
National Refuse Collection Cost Data
(Cities with Municipal Collection)

Item	Honolulu, Manual Rear Loader Service	Cities with Contract Collection	Cities with Municipal Collection
Cost/Ton:			
Direct Labor	$48.78		$30.77
Fringes	14.64		10.59
Other Operating Costs	7.67		8.25
Depreciation	6.26		7.76
City Overhead	8.30	$2.38	4.71
Contractor Payment		42.67	
Total	$85.65	$45.05	$62.07
Service Level:			
Pickups Per Week	2.00	1.35	1.35
% with Backyard Services	--	4.1%	11.5%
Tons Collected Per Household	1.93	1.33	1.33
Household/Crew Shift (Average)	600	844	745
Wage of Collector/Driver	$28,000	$24,992	$23,840
Ecodata, Inc. National Sample, 1995 data.			

As indicated, based on a national data sample, the average costs for weekly refuse collection was $6.98 per household per month. Normalizing labor costs for Honolulu labor rates increases this national average to $7.45 per household per month, or about 70% of the reported costs for manual collection service in Honolulu.

This analysis points out that the costs of manual refuse collection in Honolulu are significantly higher than the average costs of refuse collection in the continental U.S., even when differences in labor costs are accounted for.

4.3.3 Conclusions

Based on HDR's analysis, it is apparent that the performance of the City manual collection crews in Honolulu is at a high level. The costs of the equivalent once-per-week manual collection service in Honolulu, however, was found to be significantly higher than the average costs of refuse collection reported for a national data base. The analysis indicates that the costs of the Honolulu manual collection service are 30% or more above the average costs of refuse collection in other jurisdictions.

4.4 OPTIMIZATION STRATEGIES

4.4.1 Conversion from Manual Collection to Semi-Automated Collection

4.4.1.1 Introduction

One of the main goals of the City and County of Honolulu is to convert 80% of its collection service from manual collection to automated collection. Due to physical restrictions and other considerations, it is the City's current plan to continue collecting waste from the remaining 20% of the City's residences with manual, rear-loading, refuse collection trucks.

The City has been considering servicing this remaining 20% of the residences through the use of semi-automated, rear-loading, refuse collection trucks. HDR concurs that the City should pursue this approach. For purposes of this report HDR has assumed three-person crews would be used.

Semi-automated collection provides a third alternative to manual collection systems and fully automated collection systems. With a semi-automated collection truck, hydraulic "flippers" located on the rear of the truck are used to lift the container and empty its contents into the truck. These flippers can be retrofitted onto existing rear loader collection trucks or can be installed at the time of assembly on factory-built semi-automated trucks.

Customers are provided with rollout containers similar to those used for the automated collection service.

4.4.1.2 Benefits and Drawbacks

The major benefits of converting to a semi-automated collection approach are the potential for productivity improvements and reduction in collector injuries. Other benefits include the reduction of water in setouts, the ability to service both sides of the street, improvement in neighborhood aesthetics, reduction in blowing litter, and the potential for adopting pay-per-throw billing systems.

The major disadvantage, when compared to manual collection, is the likely reduction in the number of households that can be served per hour on the route, due to the time requirements associated with retrieving, emptying, and returning the cart. Other disadvantages include the capital costs associated with the purchasing of the carts and the conversion of the trucks.

4.4.1.3 Safety Impacts

The use of semi-automated collection trucks has the potential of reducing collection injuries associated with manual collection. Such injuries typically include back injuries, although puncture injuries and lacerations can also be reduced.

Rochester, New York, converted from backyard manual collection to curbside semi-automated collection. Before the conversion, the city found that the average collector was walking 13 miles per day and was lifting 6 tons per day of refuse. Following the conversion, the distance walked per collector dropped nearly 50% to 6.6 miles per day, while manual lifting was virtually eliminated. The number of days lost due to injury dropped by 4.5% while Workers Compensation costs were cut by 52%. A survey of workers found a consensus that safety and working conditions were improved and that the workers preferred the semi-automated collection approach over the manual collection when given a choice.

4.4.1.4 Productivity Impacts

The use of semi-automated collection trucks may actually decrease the on-route productivity of the manual collection crews. This is because, for each setout, the crewmember must roll the cart out to the collection vehicle, line up the cart with the lifting device, activate the lifting device, and return the cart to the curb.

In the case of Honolulu, daily crew productivity would be likely to increase through conversion from manual collection to semi-automated collection. This is because the 24,000-lb limit would

likely to be replaced by a higher limit (closer to the 1,000 households-per-day limit imposed on automated collection vehicles).

A preliminary analysis of the cost impacts of converting to semi-automated collection for 20% of the City's 171,250 households is provided in **Table 4-7.**

As indicated, the cost per household for the manual collection system was estimated to be $13.78 per household in FY 1995/6. It is reasonable to assume that system costs will remain roughly the same except for the truck conversion and rollout cart costs while productivity is increased from 600 to 900 households per crew per day. This is because the manual collection crews are currently paid for 8 hours per day while they work an average of less than 3.5 hours per day. This is also comparable with the average 930 HH/day served by the Refuse Division automated collection service and data for semi-automated collection from other systems.

After subtracting for the amortized costs of the roll-out containers and the truck flipper retrofits, HDR compares that the City could save $3.64 per household per month in FY 95/96 unit costs, or approximately 25% of FY 95/96 costs through conversion to a semi-automated collection system for the 20% of the City's residences that cannot be serviced by automated collection vehicles. This would equate to a savings of roughly 1.68 million dollars in FY 98/99 dollars as shown in **Table 4-7.**

Table 4-7
Analysis of Semi
Automatic Collection

Item	Cost
Cost/Month/Household - FY 95/96	$ 13.78
Reduced Cost/Household due to Increasing Productivity to 900 HH/Crew/Day	$ 9.23
Added Costs:	
§ Containers (1)	$ 0.83
§ Truck Retrofits (2)	$ 0.08
Net Savings FY 95/96	$ 3.64
Projected Net Savings FY 98/99 (3)	$ 4.09
Net Annual Savings FY 98/99 (4)	$1,681,000

(1) Assumes $70 per container, 10-year container life, and 7% interest rate.
(2) Assumes $10,000 costs to retrofit each truck with hydraulic flippers, 5-year flipper life, and 7% interest rate.
(3) Projected net savings assumes 4% inflation rate from FY 95/96 to 98/99
(4) Equals 171,250 HH * 0.20 served by manual collection crews * $4.09/HH/month * 12 months.